

What is Claimed:

1. An isolated and purified polynucleotide encoding a T1R receptor comprising:
 - a) the nucleotide sequence of SEQ ID NO:1, SEQ ID NO:99, SEQ ID NO:59, SEQ ID NO:60, SEQ ID NO:62, or SEQ ID NO:63,
 - b) a fragment of at least about 42 contiguous nucleotides of SEQ ID NO:1 or SEQ ID NO:99 encoding a polypeptide having substantially the same biological activity as a polypeptide encoded by the nucleotide sequence of SEQ ID NO:1 or SEQ ID NO:99,
 - c) a fragment of at least about 42 contiguous nucleotides of SEQ ID NO:59 or SEQ ID NO:60 encoding a polypeptide having substantially the same biological activity as a polypeptide encoded by the nucleotide sequence of SEQ ID NO:59 or SEQ ID NO:60, respectively,
 - d) a fragment of at least about 42 contiguous nucleotides of SEQ ID NO:62 or SEQ ID NO:63 encoding a polypeptide having substantially the same biological activity as a polypeptide encoded by the nucleotide sequence of SEQ ID NO:62 or SEQ ID NO:63, respectively,
 - e) a variant of the polynucleotide of SEQ ID NO:1 or SEQ ID NO:99 having at least 80% homology to the polynucleotide of SEQ ID NO:1 or SEQ ID NO:99 and encoding a polypeptide having substantially the same biological activity as a polypeptide encoded by the nucleotide sequence of SEQ ID NO:1 or SEQ ID NO:99,
 - f) a variant of the polynucleotide of SEQ ID NO:59 or SEQ ID NO:60 having at least 85% homology to the polynucleotide of SEQ ID NO:59 or SEQ ID NO:60 and encoding a polypeptide having substantially the same biological activity as a polypeptide encoded by the nucleotide sequence of SEQ ID NO:59 or SEQ ID NO:60, respectively,
 - g) a variant of the polynucleotide of SEQ ID NO:62 or SEQ ID NO:63 having at least 75% homology to the polynucleotide of SEQ ID NO:62 or SEQ ID NO:63 and encoding a polypeptide having substantially the same biological activity as a polypeptide encoded by the nucleotide sequence of SEQ ID NO:62 or SEQ ID NO:63, respectively,

h) a variant of the polynucleotide of SEQ ID NO:1 or SEQ ID NO:99 having at least 80% homology to the polynucleotide of SEQ ID NO:1 or SEQ ID NO:99 and encoding a polypeptide conferring modified taste perception to one or more taste stimuli relative to a polypeptide encoded by the polynucleotide of SEQ ID NO:1 or SEQ ID NO:99,

i) a nucleotide sequence encoding the amino acid sequence of SEQ ID NO:2, SEQ ID NO:61, or SEQ ID NO:64,

j) a nucleotide sequence substantially complementary to the nucleotide sequence of SEQ ID NO:1, SEQ ID NO:99, SEQ ID NO:59, SEQ ID NO:60, SEQ ID NO:62, or SEQ ID NO:63, or

k) a nucleotide sequence that hybridizes to the complement of the polynucleotide having SEQ ID NO:1, SEQ ID NO:99, SEQ ID NO:59, SEQ ID NO:60, SEQ ID NO:62, or SEQ ID NO:63 under high stringency conditions.

2. The polynucleotide of claim 1, wherein said polynucleotide is DNA.

3. The polynucleotide of claim 1, wherein said polynucleotide is RNA.

4. The polynucleotide of claim 1 comprising a variant of the polynucleotide of SEQ ID NO:1 or SEQ ID NO:99 encoding an amino acid sequence of SEQ ID NO:2 having a nonconserved amino acid substitution at residue 59 or residue 64.

5. The polynucleotide of claim 1 comprising a fragment of the polynucleotide of SEQ ID NO:1 or SEQ ID NO:99, wherein said fragment comprises a nucleotide sequence encoding an extracellular domain of the polypeptide of SEQ ID NO:2, a transmembrane domain of the polypeptide of SEQ ID NO:2, or an intracellular domain of the polypeptide of SEQ ID NO:2.

6. The polynucleotide of claim 1 comprising a fragment of the polynucleotide of SEQ ID NO:59 or SEQ ID NO:60, wherein said fragment comprises a nucleotide sequence encoding an extracellular domain of the polypeptide of SEQ ID NO:61, a transmembrane domain of the polypeptide of SEQ ID NO:61, or an intracellular domain of the polypeptide of SEQ ID NO:61.

7. The polynucleotide of claim 1 comprising a fragment of the polynucleotide of SEQ ID NO:62 or SEQ ID NO:63, wherein said fragment comprises a nucleotide sequence encoding an extracellular domain of the polypeptide of SEQ ID NO:64, a transmembrane domain of the polypeptide of SEQ ID NO:64, or an intracellular domain of the polypeptide of SEQ ID NO:64.

An expression vector comprising the polynucleotide of claim 1 operably linked to a promoter.

9. A host cell comprising the expression vector of claim 8.
10. The host cell of claim 9 wherein said cell is mammalian.
11. The host cell of claim 10 wherein said cell is a human, murine, or feline cell.
12. A cell culture comprising at least one cell of claim 8.
13. A T1R receptor polypeptide comprising:
 - a) an amino acid sequence encoded by a polynucleotide of claim 1;
 - b) an amino acid sequence of SEQ ID NO:2;
 - c) a fragment of at least 30 contiguous amino acids of SEQ ID NO:2;
 - d) a variant of SEQ ID NO:2 having substantially the same biological activity as the polypeptide of SEQ ID NO:2;
 - e) an amino acid sequence having at least one sequence variation of SEQ ID NO:2 wherein said variation confers modified taste perception to one or more taste stimuli relative to a polypeptide of SEQ ID NO:2;
 - f) an amino acid sequence of SEQ ID NO:61;
 - g) a fragment of at least 40 contiguous amino acids of SEQ ID NO:61;
 - h) a variant of SEQ ID NO:61 having substantially the same biological activity as the polypeptide of SEQ ID NO:61;
 - i) an amino acid sequence having at least one sequence variation of SEQ ID NO:61 wherein said variation confers modified taste perception to one or more taste stimuli relative to a polypeptide of SEQ ID NO:61;
 - j) an amino acid sequence of SEQ ID NO:64;

k) a fragment of at least 20 contiguous amino acids of SEQ ID NO:64;

l) a variant of the amino acid sequence of SEQ ID NO:64 having substantially the same biological activity as the polypeptide of SEQ ID NO:64; or

m) an amino acid sequence having at least one sequence variation of SEQ ID NO:64 wherein said variation confers modified taste perception to one or more taste stimuli relative to a polypeptide of SEQ ID NO:64.

14. An isolated and purified T1R3 receptor polypeptide comprising the amino acid sequence of SEQ ID NO:2.

15. An isolated and purified T1R2 receptor polypeptide comprising the amino acid sequence of SEQ ID NO:64.

16. An isolated and purified T1R1 receptor polypeptide comprising the amino acid sequence of SEQ ID NO:61.

17. The polypeptide of claim 13, wherein said polypeptide comprises a feline T1R3 receptor.

18. The polypeptide of claim 13, wherein said polypeptide comprises a feline T1R1 receptor.

19. The polypeptide of claim 13, wherein said polypeptide comprises a feline T1R2 receptor.

20. A kit for the detection of a polynucleotide encoding a feline T1R receptor comprising a polynucleotide that specifically hybridizes to a polynucleotide encoding a polypeptide of claim 13 and instructions relating to detection of said polynucleotide.

21. A method of producing a feline T1R receptor comprising culturing the host cell of claim 9 and recovering said receptor from said host cell.

22. The feline T1R receptor produced according to the method of claim 21.

23. A method for identifying compounds that interact with a feline T1R receptor comprising:
contacting a T1R receptor of claim 13 with a test compound, and
detecting interaction between said receptor and said compound.

24. The method of claim 23, wherein said receptor is bound to a solid support.

25. The method of claim 24, wherein said solid support is formulated into a feline-specific electronic tongue.
26. The method of claim 23 wherein said step of contacting said T1R receptor with said test compound occurs in the presence of a dimerization partner of said T1R receptor.
27. A method for identifying an agonist of a feline T1R receptor comprising:
- expressing a polynucleotide of claim 1 in the presence of a test compound, and
- detecting an increase in biological activity of a polypeptide produced by said expression step in the presence of said compound relative to biological activity of said polypeptide in the absence of said compound.
28. The method of claim 27 wherein said polynucleotide is expressed in the presence of the dimerization partner of said T1R receptor.
29. A method for identifying an agonist of a feline T1R receptor comprising:
- contacting a polypeptide of claim 13 with a test compound, and
- detecting an increase in biological activity of said polypeptide in the presence of said compound relative to biological activity of said polypeptide in the absence of said compound.
30. The method of claim 29 wherein said contacting step occurs in the presence of a dimerization partner of said polypeptide.
31. A method for identifying an antagonist of a feline T1R receptor comprising:
- expressing a polynucleotide of claim 1 in the presence of a test compound, and
- detecting a decrease in biological activity of a polypeptide produced by said expression step in the presence of said compound relative to biological activity of said polypeptide in the absence of said compound.
32. The method of claim 31 wherein said expressing step occurs in the presence of a dimerization partner of said T1R receptor.
33. A method for identifying an antagonist of a feline T1R receptor comprising:
- contacting a polypeptide of claim 13 with a test compound, and

" " " " detecting a decrease in biological activity of said polypeptide in the presence of said compound relative to biological activity of said polypeptide in the absence of said compound.

34. The method of claim 33 wherein said contacting step occurs in the presence of a dimerization partner of said T1R receptor.

35. The method of claim 29 wherein said polypeptide is bound to a solid support.

36. The method of claim 35 wherein said solid support is formulated into a feline-specific electronic tongue.

37. The method of claim 33 wherein said polypeptide is bound to a solid support.

38. The method of claim 37 wherein said solid support is formulated into a feline-specific electronic tongue.

39. A method of identifying a feline T1R3 receptor variant that confers modified taste perception comprising expressing a variant of the polynucleotide of SEQ ID NO:1 or SEQ ID NO:99 having at least 80% homology to the polynucleotide of SEQ ID NO:1 or SEQ ID NO:99 and detecting an increase or a decrease in the biological activity of the polypeptide encoded by the variant relative to the biological activity of the polypeptide encoded by SEQ ID NO:1 or SEQ ID NO:99.

40. A method of identifying a feline T1R2 receptor variant that confers modified taste perception comprising expressing a variant of the polynucleotide of SEQ ID NO:62 or SEQ ID NO:63 having at least 75% homology to the polynucleotide of SEQ ID NO:62 or SEQ ID NO:63 and detecting an increase or a decrease in the biological activity of the polypeptide encoded by the variant relative to the biological activity of the polypeptide encoded by SEQ ID NO:62 or SEQ ID NO:63.

41. A method of identifying a feline T1R1 receptor variant that confers modified taste perception comprising expressing a variant of the polynucleotide of SEQ ID NO:59 or SEQ ID NO:60 having at least 85% homology to the polynucleotide of SEQ ID NO:59 or SEQ ID NO:60 and detecting an increase or a decrease in the biological activity of the polypeptide encoded by the variant relative to the biological activity of the polypeptide encoded by SEQ ID NO:59 or SEQ ID NO:60.

42. The host cell of claim 9 wherein said cell is a bacterial cell.

43. A T1R receptor comprising at least one extracellular domain of a feline T1R receptor.
44. The receptor of claim 43 wherein said extracellular domain comprises:
- a) amino acids 1-563, amino acids 624-635, amino acids 701-726, or amino acids 781-792 of SEQ ID NO:61,
 - b) amino acids 1-147 of SEQ ID NO:64, or
 - c) amino acids 1-571, amino acids 628-641, amino acids 705-731, or amino acids 787-794 of SEQ ID NO:2.
45. A T1R receptor comprising at least one transmembrane domain of a feline T1R receptor.
46. The receptor of claim 45 wherein said transmembrane domain comprises:
- a) amino acids 564-589, amino acids 604-623, amino acids 636-660, amino acids 681-700, amino acids 727-748, amino acids 761-780, or amino acids 793-817 of SEQ ID NO:61,
 - b) amino acids 148-167 of SEQ ID NO:64, or
 - c) amino acids 572-594, amino acids 610-627, amino acids 642-664, amino acids 681-704, amino acids 731-754, amino acids 767-786, or amino acids 795-812 of SEQ ID NO:2.
47. A T1R receptor comprising an intracellular domain of a feline T1R receptor.
48. The T1R receptor of claim 47 wherein said intracellular domain comprises:
- a) amino acids 590-603, amino acids 661-680, amino acids 749-760, or amino acids 818-841 of SEQ ID NO:61,
 - b) amino acids 168-391 of SEQ ID NO:64, or
 - c) amino acids 595-609, amino acids 665-680, amino acids 755-766, or amino acids 813-865 of SEQ ID NO:2.
49. The T1R receptor of any one of claims 43-48, wherein said receptor is a chimeric receptor.
50. A polynucleotide encoding the T1R receptor of any one of claims 43-48.

51. A transgenic animal comprising a heterologous feline T1R receptor allele.

52. The animal of claim 51 wherein said T1R receptor allele is under the control of an inducible promoter.

53. The animal of claim 51 wherein said T1R receptor allele is under the control of a constitutive promoter.

54. The animal of claim 51 wherein said T1R receptor allele comprises the polynucleotide of claim 1.

55. The animal of claim 51 wherein said animal is indifferent to sweet taste stimuli.

56. The animal of claim 51 wherein said animal shows a preference for sweet taste stimuli.

57. An isolated antibody that specifically immunoreacts with at least one epitope of a feline T1R receptor or dimer.

58. The antibody of claim 57 wherein said receptor is a polypeptide of claim 13.

59. A method for identifying compounds that interact with a feline T1R receptor dimer comprising:

contacting T1R receptor dimer comprising a T1R receptor of claim 13 with a test compound, and

detecting interaction between said dimer and said compound.

60. A method for identifying an agonist of a feline T1R receptor dimer comprising:

contacting a T1R receptor dimer comprising a polypeptide of claim 13 with a test compound, and

detecting an increase in biological activity of said dimer in the presence of said compound relative to biological activity of said dimer in the absence of said compound.

61. A method for identifying an antagonist of a feline T1R receptor dimer comprising:

contacting a T1R receptor dimer comprising a polypeptide of claim 13 with a test compound, and

detecting a decrease in biological activity of said dimer in the presence of said compound relative to biological activity of said dimer in the absence of said compound.

62. The method of any one of claims 59, 60, or 61, wherein said dimer comprises two T1R1 receptors, a T1R1 receptor and a T1R3 receptor, two T1R2 receptors, a T1R2 receptor and a T1R3 receptor, or two T1R3 receptors.

63. The method of claim 62 wherein each T1R receptor of the T1R receptor dimer is a feline T1R receptor.

64. A T1R receptor dimer comprising at least one polypeptide of claim 13.

65. The T1R receptor dimer of claim 64 wherein said dimer is a homodimer.

66. The T1R receptor dimer of claim 64 wherein said dimer is a heterodimer.

67. The T1R receptor dimer of claim 64 comprising at least one polypeptide of SEQ ID NO:2.

68. The T1R receptor dimer of claim 64 comprising at least one polypeptide of SEQ ID NO:61.

69. The T1R receptor dimer of claim 64 comprising at least one polypeptide of SEQ ID NO:64.

70. The T1R receptor dimer of claim 67 further comprising a polypeptide of SEQ ID NO:2, SEQ ID NO:61, or SEQ ID NO:64.

71. The T1R receptor dimer of claim 68 further comprising a polypeptide of SEQ ID NO:2, SEQ ID NO:61, or SEQ ID NO:64.

72. The T1R receptor dimer of claim 69 further comprising a polypeptide of SEQ ID NO:2, SEQ ID NO:61, or SEQ ID NO:64.